THE UNIVERSITY ALBERTA

MATERNAL ANXIETY AND THE NEWBORN

BY

FAWZY H. MORCOS

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

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MATERNAL ANXIETY AND THE NEWBORN

Degree for which thesis was presented
Grade pour lequel cette thèse fut présentée

Master

Year this degree conferred
Année d'obtention de ce grade 1985

University – Université

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DEDICATION

To all my patients, whose help and cooperation made this study possible.

ABSTRACT

The purpose of this research project, is an attempt to determine the relationship between the maternal anxiety and the outcome of the pregnancy through specific measurements in both the mother and the newborn. The experiment took place during the months of November and December, 1984. A complete record was kept of the antenatal period, labor, delivery and immediate postpartum phase in hospital. Length and type of labor, analgesic and anaesthetics during labor and delivery were recorded. Following the delivery of the infant, there was a collection of blood samples from the umbilical vein for the biochemical study. Data collection in the infant using the Brazelton Neonatal Assessment Scale 72 - 96 hours after delivery.

The study population is limited to expectant mothers (N-45) who were seeking prenatal care during this period through my office.

The Taylor's Manifest Anxiety Scale and the Pitts Depression Scale were given to the mother one to five weeks prior to the expected date of confinement. Scores from these two scales were correlated with the complications of pregnancy, labor and delivery. They were also correlated with biochemical parameters that are known to have detrimental effects on the newborn, with Apgar Scores and neonatal behavior scores.

The most significant finding is the relationship between the Taylor's Manifest Anxiety scores and the duration of labor in hours. The higher the anxiety scores the shorter the duration of labor. There was no significant relationship between the anxiety scores and the complication or the neonatal behaviour scores.

ACKNOWLEDGEMENTS

I am grateful to all those who provided assistance and encouragement for this research project.

Dr. F. Morrison and Dr. W. Schmidt, for their guidance. The staff of I.C.U. Blood Gas Laboratory of the Misericordia Hospital, especially Dr. Mark Heule and Mr. Bryan Walsh. The Labor and Delivery Staff of the Misericordia Hospital ; and the Research and Statistics Department of the Faculty of Education, in particular Dr. S. Hunka and Dr. Harley.

INTRODUCTION

It has been estimated that 10% - 20% of all maternity patients designated as "low risk" develop complications during labour and delivery. Furthermore, "non-progressive" labour remains one of the commonest complications of labour and essentially a problem of the "primiparous" woman. The etiological factors of this complication remain to a large extent unknown.

The incidence of Caesarean Sections remains high (13% - 20% of all pregnancies). The major indication is non-progressive labour. Therefore, any study which attempts to identify factors, other than the known physical ones, which lead to fetal distress and/or non-progressive labour, is needed.

Furthermore, the teaching in medical schools and residency programs is almost exclusively focused on the organic aspects of obstetrics, mechanics, modern technology, fetal monitors and ultrasonography, hormonal assessment, caesarian sections and so on. These are of primary importance and must be continued and amplified. However, this emphasis is not geared to prepare the physician to recognize and evaluate the other aspect of pregnancy, that is the emotional needs of the pregnant patient. Pregnancy, after all, is a critical period in the woman's developmental stages, and can be a psychological crisis in her life and that of her family. The degree of influence of the emotional factors on pregnancy labor, delivery and the newborn, and the exact relationship

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between the psychological and physical factors are not absolutely clear. Many questions remain unanswered - This study is an attempt to answer some of these questions.

REVIEW OF LITERATURE

Emotional tensions resulting from varied and multiple psychological stresses have a diverse and complex influence on reproduction (Mayers 1975). Pregnancy is in itself a psychological stress, causing changes in many organic systems (McDonald 1968). Cherbok (1971) is of the opinion, that delivery is a psychosomatic process par excellence, because psychology and physiology are inseparable. According to him, many aspects of labour are of psychosomatic nature, including both the physiology of labour, and the ever-present question of pain.

Pajntar (1964), Ferriers (1965), McDonald (1968), Gorsuch et al (1974) and Mayers (1975); have found a relationship to exist between the various abnormalities of pregnancy, labour and child development on the one hand, and the prenatal psychological condition of the mother on the other. A conclusion from better controlled studies was that psychological differences consistently exist between complication samples and normal samples. Self-reported anxiety was the major factor differentiating normal from abnormal groups, according to the reports of some authors (McDonald 1968, Gorsuch et al. 1974). Others view the problem from a wider horizon, and believe this process to be neuroticism (Deutsch 1944, Pajntar 1964, 1971, 1976, 1977). It has even been suggested that antenatal anxiety is associated with major morphological anomalies, such as cleft palate and Down's Syndrome as well as diseases like diabetes & pre-eclampsia. The causes for disturbances in the onset and course of labour are varied. In recent years the role of

psychosomatic factors are given an ever-increasing significance. The importance of psychological factors for uterine activity was already noted by Deutsch (1944), who, from a psychoanalytical point of view said that uterine activity can be disturbed in neurotic individuals.

Naaktgeboren and Bantekoe (1976), from observations and experimental findings of the effects of emotional influences, anxiety, fright and stress due to environmental factors on the course of pregnancy and labour in several mammalian species reported that stress can cause abortion. Stress can also affect fetal growth and development. In primates, placental malformations due to stress have been described. Stress promotes an excess secretion of epinephrine causing uterine arterial constriction and increases uterine activity.

Newton et al. (1966) also discovered that stress conditions in mice extended the birth process.

Most authors speak of prolonged labour usually as a result of non-coordinated or weak contractions. A few (McDonald 1968) include very quick labour (precipitate) as a disturbance in the course of labour. It is also believed that the most important complication of labour which has a psychologic cause is uterine dysfunction which leads to prolonged labour. This can lead to several other complications such as insufficient oxygenation of the fetus leading to fetal distress and frequent obstetric operations. Anxiety levels have been found to correlate with length of labour and with the weight of the baby at

birth. Maternal anxiety in pregnancy and psychological conflict measured retrospectively after delivery, have been related to dysfunctional and prolonged labour. Prill (1971) found that the manifest anxiety values measured with the MA scale are significantly lower in women with fast labours. On the Rorschach test he found that anxiety of women who have short labours can be insignifcant. He characterized these women psychically with a certain carelessness, free of anxiety, but not always with indifference. Prill believes, that the psychological factors which he mentions seem to hint that precipitate labour corresponds less to muscular insufficiency than to central mechanism which can be influenced psychologically.

Pajntar in 1973, in his research of fear and anxiety during labour found a relationship between great fear and a long second stage of labour in primipara. He did not find otherwise any connection between the magnitude of conscious fear and complications in the process of labour, and since he found other normal women with much fear associated with the social stress of labour, gave birth without complications, he formed the following hypothesis: "That stress and emotional tension originating from fear can cause disturbances in the course of delivery only in neurotic-vegetative labile women in whom inadequate somato-physiologic reaction was already present."

These findings have generated questions concerning the important psychological variables in pregnancy and the physiological mechanisms by which conflict and anxiety might influence uterine activity and progress in labour.

Naakogeboren et al. (1971, 1974), on the basis of studies on different animals, found, that disturbances, anxiety and many other psychogenic factors may cause severe changes in the pattern of uterine activity. In all mammalian species which have been studied (including the human), the female is able to suppress labour activity involuntarily if she is in danger or if she is severely disturbed. The author suggests that the effect of stress on uterine motility is mediated by an increase in epinephrine release.

Epinephrine and non-epinephrine are recognized as stress related biochemical measures. There is evidence to suggest that epinephrine, as well as other B Sympathomimetic agents, inhibit uterine motility and that non-epinephrine is associated with increased or incordinate uterine activity.

Lederman and Associates (1979) found that the maternal endogenous epinephrine level was significantly elevated in labour, compared to pregnancy and that the epinephrine level was highly correlated with the concurrent measure of anxiety state. Exogenous epinephrine administration in labour has been observed to result in decreased uterine activity. It has also been observed to result in fetal heart rate deceleration, attributable to arterial vasoconstriction and decreased blood flow and oxygen transport to the fetus.

Recent reviews of animal research with primates and sheep provide evidence for the detrimental effect of experimentally induced maternal

excitement in fetal heart rate and health status. An elevated maternal epinephrine level, resulting from stress, can effect blood flow to the fetus through an alpha-adrenergic constriction effect in the uterine vasculature. Relationships between maternal anxiety and fetal/newborn health status, have previously been reported. Crandon (1979) found a significantly higher incidence of fetal distress and lower apgar scores for newborn infants of mothers classified as hightly anxious in third-trimester pregnancy.

Drugs with alpha-adrenergic stimulation action, have been shown to decrease uterine blood flow and intervillous perfusion as reflected by a decrease in fetal PO_2 and PH; and an increase in PCO_2.

Normal labour is characterized by intermittent episodes of acute hyperventilation which occur in response to painful uterine contractions. These episodes recur with ever increasing frequency as labour progresses. As a result, arterial PCO_2 values fall early in labor and continue to fall until full cervical dilatation, by which time PCO_2 values between 20 and 25 mmHg are often seen (Pearson and Davis, 1973).

The sequence of events during the "normal" first stage of labor in terms of acid-base balance in the mother is as follows:

1. At the onset of labor, the mother is in a state of compensated respiratory alkalosis.

2. During the latent phase of labor, there is a super added uncompensated respiratory alkalosis causing a rise in PH.

3. During the active phase of labor, a metabolic acidosis occurs which over compensates for the low PCO_2 values, leading to a PH value somewhat lower than normal at full dilatation. But if labor is prolonged and difficult, the metabolic acidosis may be more severe.

The possible explanation for the above changes can be summarized as follows:

1. There is a prompt renal bicarbonate excretion in response to acute hyperventilation, which is reflected in a rapid fall of plasma bicarbonate. This will lead to maternal metabolic acidosis.

2. Patients who hyperventilate, voluntarily produce far more lactate than those who merely passively hyperventilate (Huckabee, 1958).

3. Skeletal muscular activity in response to pain may increase lactate production to a variable extent.

4. Fear and apprehension with consequent endogenous adrenalin production may also be incriminated.

5. If the mother is rendered pain-free throughout labor by means of continuous lumbar epidural block, episodic hyperventilation ceases (Pearson, 1972), and the progressive maternal metabolic acidosis does not occur (Pearson and Davies, 1973 a). Therefore, it seems likely that active hyperventilation is mainly responsible for the metabolic acidosis, the contribution made by the metabolites produced by the contracting uterus being of little significance.

6. Crawford (1972) suggested that pain may induce changes in peripheral blood flow leading to inadequate tissue perfusion and that the metabolic acidosis may in part reflect chronic tissue hypoxia.

7. The progressive maternal metabolic acidosis of the second stage of labor is probably the result of the expulsive and ventilatory efforts made by the mother. The PH of the mother falls rapidly and like the base excess is time dependent. The rate of fall of maternal PH is about 0.025/15 minutes spent bearing down in the second stage (Pearson and Davies, 1973 b).

Pregnancy is a time for a pregnant woman to begin to establish a relationship with her child. The heightened sensory awareness of the child's presence and behaviour within her causes a turning inward, (Deutsch, 1944). Studies at Harvard indicated that to a considerable extent, it is possible to predict from the moment of conception, the kind of relationship that a mother will have with her infant. (Caplin,

1959). This can be done by assessing the mother's attitudes towards her pregnancy, the unborn child and the manner in which the expectant family progresses through the maturational crisis of pregnancy and parenthood. Pregnancy is a period of identity, reformulation and personality maturation. Specific psychological tasks have been identified as being important to the successful progression through this developmental phase, (Tanner, 1969; Rubin, 1974; Colman and Colman, 1974; Clark and Affonso, 1976). These psychological tasks include:

i) pregnancy validation;

ii) fetal embodiment through the incorporation and integration of the fetus into her own body image and as an integral part of self;

iii) fetal distinction - with quickening, the woman perceives the fetus as a separate object, seeing the infant's needs as separate from her own;

iv) role transition through preparation for labor and delivery and for the caretaking relationship.

Successful resolution of each of these tasks prepares the pregnant woman to cope with future tasks and will enable her to possess resources for giving to a dependent, helpless infant. When these critical tasks are not resolved, this may lead to difficulties in mothering; while when resolved, the woman completes her expectant phase with growth, self-esteem and autonomy.

An attempt was made by some authors to differentiate expectant women in terms of their adjustment in order to find correlates to pathological reactions. When personality scores were used (M.M.P.I. and M.A.S.), they found that women with prenatal or postnatal difficulties tended to obtain abnormal scores during pregnancy or postpartum (McDonald, 1968; Taylor, 1956; Pitt, 1968).

Anxiety has been the most general concept that has been used to describe the psychological condition with obstetric complications. Davids and Devault (1962), administered the Manifest Anxiety Scale (Taylor's M.A.S.), which is a true-false questionnaire referring to physical and emotional feelings, commonly believed to be indicative of manifest anxiety to a group of women during pregnancy and in the post-partum period. They found that the women who were later to have abnormal delivery room records, had higher manifest anxiety scores during pregnancy than the women who later had normal delivery room records. There was no difference following delivery. Brown (1964), also used the Manifest Anxiety Scale during pregnancy, but he did not find that the level of expressed anxiety related to the length of labor, though it did relate to bodily symptoms during pregnancy.

The influence of psychological stress on behavioural outcomes is not very clear. However, there is some evidence that neonatal behaviour organization may be influenced by the level of anxiety experienced by the mother prior to the birth of the infant. Infants of mothers experiencing prolonged periods of severe anxiety during late pregnancy

have been observed by Sontang (1941), to be highly active and irritable with severe food intolerance. Sameroff and Associates (1975) found that infants born to highly anxious mothers were less alert and responsive to stimulation than were infants of less anxious mothers. Ottinger and Simmons (1964), found that prenatal anxiety was related to the amount of crying observed in the neonatal nursery from the second through the fourth day of life. Bakow, et al, (1973), noted that the Neonatal Behavioural Assessment Scale (NBAS) factor scores were related to later perceptions of infant temperament at four months. Davids, Holden, and Gray (1963) assessed the adjustment of infants and mothers eight months after birth and found that children of highly anxious mothers fared less well on the Bagley Mental and Motor Scales, than did infants of less anxious mothers. Abramson, et al, (1969) noted a relationship between emotional stress during pregnancy and a low level of motor development at birth, but by the time the baby was thirteen weeks old, there was no longer any difference between the high and low stress groups. Downs (1964) studied maternal stress in primigravidas as a factor in the production of neonatal pathology.

The ultimate purpose of this project was to find out if anxiety as measured late in pregnancy has any detrimental effect on the course of labor and the health of the newborn. If this was found, then anxiety scales could be used routinely antenatally and those that require help or counselling could be identified.

Specific Research Questions

The following questions constitued the "guiding hypothesis" underlying this study:

1. What is the relationship between maternal anxiety and complications in pregnancy, labor and delivery?

2. What is the relationship between maternal anxiety and apgar score of the baby?

3. What is the relationship between maternal anxiety and biochemical values in the venous cord blood (pH, HCO_3 and Base excess), immediately after delivery?

4. What is the relationship between maternal anxiety and the neonatal behaviour?

Research Objectives

1. To determine the anxiety state in the third trimester of pregnancy?

2. To determine if there is any detrimental effect of maternal anxiety on the newborn through the measurements of several variables of both mother and baby.

3. To devise means of alleviating maternal anxiety to improve the pregnancy outcome if detrimental effects are found.

4. To communicate the findings to relevant health care programs and professional associations.

METHODS OF PROCEDURES

1. The study population were those pregnant women in their last six weeks of pregnancy, who were attending my private office through seeking prenatal care.

2. The total number of women were 45.

3. Only those who were designated "low-risk" were asked to participate in the study.

4. The study was explained to the patients and the objectives outlined.

5. Every pregnant woman was given Taylor Manifest Anxiety Scale and Pitt's Scale and asked to answer and return to my office the next visit. The Scales were signed by the women. The Taylor's Manifest Anxiety Scale (Taylor's M.A.S.) is a 50 true-false questionnaire referring to physical and emotional feelings commonly believed to be indicative of manifest anxiety. This scale was drawn by Taylor from the MMPI (1953). The scale was treated as a continuous distribution score.

Brice Pitt (1968), devised a 24 questionnaire to measure maternal anxiety and depression before and after childbirth. The questionnaire's success in finding cases of puerperal depression

was significant. It must be emphasized, that what is important in this measurement was the difference in score between pregnancy and post-partum in the same woman, rather than the comparison in scores of different women.

6. The project has been explained and approved by:

   a) The staff of the Blood Gas Laboratory in the Intensive Care Unit at the Misericordia Hospital.
   b) The Research and Ethics Committee at the Misericordia Hospital. The protocol was outlined and distributed to the members of the Committee. Furthermore, I personally attended their meeting and explained the project. The project was further approved by the Medical Advisory Committee.
   c) The Supervisor and the Nursing Staff of Labor and Delivery at the Misericordia Hospital.

7. A cord blood sample was taken from the umbilical vein immediately after delivery by myself. A 0.75 ml. was taken from the umbilical vein after clamping the cord, in the segment between the second baby clamp and the placenta. The sample was sent to the I.C.U. Blood Gas Laboratory as soon as it was collected, with a blood requisition with the word Research written beside my name.

8. The outcome of delivery, i.e. spontaneous, forceps, caesarean section, etc., length of labor and any complications of labor and

delivery were recorded and entered into the study. The condition of the baby at birth, apgar score, the need for admission to NICU, and weight of the baby were all recorded for study purpose.

9. The method of assessing the infant's behaviour was the Brazelton Neonatal Behavioural Assessment Scale, which is a means of scoring interactive behaviour. (Brazelton, 1973). There are twenty-seven major categories of items scored on a nine point scale. The infant scale has been widely researched, the data content in terms of its being acceptable, in terms of test-retest reliability by independent testers has been reported on the .85 to 1.0 level.

Each infant in this project was assessed with the Brazelton Scale between 72 hours and 96 hours after delivery. The examiner has just obtained a Masters Degree in Boston and was working with Dr. Herdelise Als., PhD, in the Child Development Unit at the Children's Hospital Medical Center, Boston, Massachusetts.

RESULTS

Characteristics of the Research Subjects

Age: The woman's age range was 19 to 40 years - 35 women were under the age of 30.

Occupation: This varied from housewife, professional, clerical and technical.

Parity: The women's parity ranged from 0 to 4, para 0 (nulliparous) means that the pregnancy under investigation was her first pregnancy. Twenty two women were nulliparous. Fifteen had one baby before, three had two babies (para two), three had three babies (para three) and one had four babies.

In an attempt to answer the specific research questions by examining the relationship between maternal anxiety and several selected parameters in the mother and the baby; a multiple correlation matrix was generated with the following variables tested: The scores of Taylor's Manifest Anxiety Scale was correlated with the values of:

1. Apgar scores at one minute (Apgar I)
2. Apgar scores at five minutes (Apgar II)
3. Weight of the newborn baby
4. Complications of pregnancy, labor and/or delivery.
5. Length of labor in hours.
6. pH of the umbilical venous blood

7 HCO_3 (The Bicarbonate) of the umbilical venous blood.

8. Base excess of the umbilical venous blood.

The same method was used to study the correlation between the scores of Pitts' Depression Scales and the values of the eight variables outlined above.

For every baby a behavior scoring sheet was used. The scores of the twenty seven items of the Brazelton Behavioral Assessment Scale were correlated individually and collectively with 1) scores of the maternal anxiety using the Taylor Manifest Anxiety Scale and 2) scores of the maternal depression using the Pitts' Depression Scale.

The gestational age at the time of delivery was between thirty six and forty two weeks. Only one baby was born at thirty six weeks gestation and two were at forty two weeks.

Length of labor ranged from one and a half hours to twenty three hours. Six were under two hours in labor and six were over fifteen hours. Fourteen were under five hours. Thirty were under ten hours.

Twenty eight women had spontaneous vaginal deliveries. Thirteen required induction of labor and six required augmentation of labor. Out of a total of forty five patients, five required caesarian sections and eleven forcep deliveries.

The weight of the babies ranged from 2780 grams to 4650 grams. Two babies were under 3,000 grams and seven were over 4,000 grams. Thirty six babies were between 3,000 and 4,000 grams.

Apgar scores of the babies at one minute varied from 02 - 09. One had apgar of 02, one of 04, two of 06 and five of 07. Thirty six babies had each apgar of 8 or 9. Apgar scores at five minutes were all 08 or more. Thirty three had apgar of 09, 9 had 10 and 3 had 08. The results showed that scores of Manifest Anxiety Scale ranged from 08 to 29. The scores of Pitt's scale ranged from 09 to 18.

The most surprising finding was the relationship between Taylor Manifest Anxiety Scores and the duration of labor in hours. The higher the anxiety score, the less the duration of labor; correlation coefficient 00.393, probability 0.012, ξ = .05. This finding shows that a relationship exists between the degree of anxiety and the length of labor, but in a negative way or "inverse" proportion. This is not what most authors have reported. We have seen in the review of the literature, that dysfunction uterine action or prolonged labor was perhaps the most important factor that has attracted the attention of the researchers in the field. Indeed this is the case. The reasons are clear, of special significance is the detrimental effect of the prolonged labor on both mother and baby. Furthermore, from an obstetric physiological standpoint the reasons are not very clear. How can one explain a primigravida with a "good" size pelvis and a "normal" size baby with "moderate" uterine contractions; in spite of "adequate"

medical treatment fails to progress and require all types of obstetric interference. Psychologists have taken over where obstetricians have failed to explain - Psychologists have found that prolonged and non-progressive labor is more frequent among those women who are more anxious. Short or precipitate labor (Prill 1971) occurs more in women who are less anxious.

One may argue that the sample presented is a small one and attending the office of a "specialist" who is known for his views of "natural" childbirth. The sample may be biased as such as they perhaps have similar motivation. Nevertheless, it is a surprising and an important finding and cannot be ignored. A larger sample is perhaps required.

Other findings included the relationship between the Taylor Manifest Anxiety Scale and the biochemical parameters; pH, HCO_3 and base excess.

There was no significant correlation between either the Taylor Manifest Anxiety scores or the Pitt's depression scores and any of the biochemical parameters. There was a significant correlation between the scores of the Taylor Manifest Anxiety Scores and apgar scores as measured at five minutes: the higher the anxiety scores, the lower the apgar scores - the correlation coefficient at - 0.319, probability at 0.045.

There was a significant correlation between apgar scores as measured at one minute and apgar scores as measured at five minutes. The higher the

scores at one minute, the higher at five minutes, and the lower the scores at one minute, the lower at five minutes - correlation coefficient 0.389, probability 0.013.

The complications were grouped into five categories 0-5. When these were correlated with the anxiety scores, there was an apparent significant relationship. But it was realized that the number assigned to each complication was independent of the severity and/or the number of complications.

The scores of the Taylor Manifest Anxiety Scale were divided into three groups as low, medium and high; these were then correlated with the complications using the Chi-Square. There was no significant correlation. The same method was used with the Pitt's depression scores. There was no significant correlation with the complication. Furthermore, the scores of the two scales were divided into two groups, rather than three and using analysis of variance, there was no significant correlation with complications.

The twenty seven items of the Brazelton Behavioural Assessment scale were correlated individually and collectively with the scores of the Taylor Manifest Anxiety Scale and Pitt's Depression scale. There was no significant correlation found.

DISCUSSION

Roberto Caldeyro-Barcia (1980), from several studies of the factors influencing the length of labor, indicated that if all other factors are constant, the duration of the first stage of labor was significantly abbreviated when mothers were constantly in a vertical position (ie sitting, standing or walking). A group of women in labor, in a vertical position were compared to "a similar" group in a horizontal position; the median duration of the first stage of labor was 135 minutes for the "vertical" group and 180 minutes for the "horizontal" group. The difference of 45 minutes is highly significant and corresponds to a shortening of 25% in the duration of the first stage for the vertical group. They also found that the shortening in the duration of the first stage in the "vertical" group was more pronounced when only primigravidas were considered. In our study, the patients were encouraged to walk or sit down, rather than to remain in horizontal positions. The explanations given for the shorter duration of the first stage in the vertical position include:

a) The intensity of the contractions and their ability to dilate the cervix is greater in the vertical than in the supine position;

b) In the vertical position, the action of gravity on the fetus is synergic to that of uterine contractions. According to Mendez Bauer, c. et al. the weight of the fetus adds 35 mm. Hg to the pressure exerted by the fetal head on the cervix;

c) The much greater freedom of movement of the mother in the vertical position might be helpful for the progress in labor.

We have failed to show any correlations between anxiety or depression scores and the biochemical data.

Caldyro-Barcia has shown higher values of PH in the umbilical vein and PO2 and lower values of PCO2 than those reported as "normal" by all the authors who have published their findings in uncomplicated labors occurring spontaneously at term in low risk pregnancies.

The explanations given for this difference include:

1. The sitting position of the mother, which increases pulmonary ventilation at the lower lung zones, raising PO2 and PH and reducing PCO2 in maternal blood (ANG, C.K. et al, 1969).
2. Prevention by the sitting position of the compression of the inferior vena cava and of the aorta and iliac arteries. These vessels are compressed between the pregnant uterus and the spine when the mother is in the lithotomy position. The resulting circulatory disturbances may reduce the maternal perfusion of the placenta, causing fetal hypoxia, hypercapnia and acidosis (Humphrey, M.D. et.a., 1976; ANG, C.K. et al, 1969).

We have failed to show any correlation between anxiety or depression scores and the Brazelton Neonatal Behavioral Assessment Scale.

The whole aspect of mother-infant interaction has been based on the premise that the mother and infant constitute a system which is psychobiological in nature and is characterized by mutual modification

of behavior. Both infant and mother bring to this system characteristics that developed prior to the infant's birth and the behavior interaction thereafter develops as a consequence of synchrony of behaviors. Therefore, the earliest organization of the mother-infant system occurs as a function of both the mother and her infant; the infant's capabilities for indicating its status, signalling its needs and responding to maternal interventions; and the mother's ability to perceive cues provided by her infant and to respond appropriately to these cues.

Urie Bronfenbrenner (1974), in his arguments on "Toward an Experimental Ecology of Human Development", critizes the work of Klaus and Kennel as follows:

> "The principle of reciprocity, of course, raises the question of whether the distinctive behavior of the mothers in the experimental group might not have occurred, at least in part, as a response to a sequence of activities initiated by the developing infant and reciprocated by the mother in a progressively evolving pattern of social interaction. Regrettably, the possibility remains unexplored. In keeping with the classical experimental model, the focus of scientific attention in these studies was limited to the subjects of the research, who in this instance, were not the children, but the mohters. The omission, is all the more remarkable given the fact that the infants were always present in the research situation and what is more, that all of the mother's behavior being observed was directed toward them."

That is, the total social system actually functioning in the given situation, must be taken into account. This particular system is what Urie Brofenbrenner refers to as the "microsystem".

The majority of the studies in this area have focused on the effect of prenatal anxiety on reproductive complications, without tracing further the effect of these complications on later behavioral outcomes for either the mother or the baby. Sameroff and Chandler (1975), recently noted that all other circumstances being equal, reproductive complications do not usually have lasting detrimental effects. Hence, they have questioned whether, when subsequent developmental difficulties do occur, both the earlier complications and the later development difficulties might result from the poor psychological state of the mother. Indeed, Sameroff and Kelly (1977) have suggested that prenatal anxiety may be related to infant behavior via many routes. Possibly, the prenatal anxiety could influence the course of pregnancy and delivery, as suggested by previous research; or anxiety could be related to neonatal behavior; or anxiety could influence the ways in which the mother and child interact, thus culminating in developmental deviations.

In a previous study Vetsch, Morcos, Funke-Furber (1977), we did not find any significant relationship between anxiety/depression status of the mother and the baby. However, we stated that there may be subtle differences which may influence the mother-infant interaction. Furthermore, in the same study (1977), we did not find that obstetric medications, either amount or type, had any significant relationships with any of the items in the Brazelton Scale. The same conclusions were reached by Horowitz et al (1978), namely that light to moderate amounts of medications do not significantly influence neonatal behavior. Accordingly, we did not attempt to compare these in our present

research. In the same previous study, we noticed that there was no relationship between anxiety/depression antenatally and the complications of labor and delivery.

Furthermore, we did not find that anxiety increases from the first to the third trimester.

One may then pose the question, "Is anxiety or increased anxiety harmful during pregnancy?"

In 1978, Donald Winnicott, a Pediatrician and Psychoanalyst, proposed that a healthy mother goes through a period of "primary maternal preoccupation"

> "It is my thesis that in the earlier phase, we are dealing with a very special state of the mother, a psychological condition which deserves a name, such as primary maternal pre-occupation. I suggest that sufficient tribute has not yet been paid in our literature, or perhaps anywhere, to a special psychiatric condition of the mother, of which I would say the following things: It gradually develops and becomes a state of heightened sensitivity during and especially toward the end of the pregnancy. It lasts for a few weeks after the birth of the child. It is not easily remembered by mothers once they have recovered from it. I would go further and say that the memory mothers have of this state tends to become repressed. I do not believe that it is possible to understand the functioning of the mother at the very beginning of the infant's life, without seeing that she must be able to reach this state of heightened sensitivity, almost an illness, and to recover from it. I bring in the word "illness" because a woman must be healthy in order both to develop this state and to recover from it as the infant releases her. If the infant should die, the mother's state suddenly shows up as illness. The mother takes this risk."

One suspects that hormonal changes play a significant role in starting and enhancing both of these processes.

Klaus (1976) states that "the heightened sensitivity of primary maternal pre-occupation is sometimes misinterpreted by physicians and nurses as excessive anxiety."

In our study, the correlation between anxiety and apgar scoring in five (5) minutes is clinically meaningless. The apgar score in this group of women at five minutes were 8 - 10 and this is excellent.

SUMMARY AND CONCLUSIONS

The study was primatily designed to investigate the relationship between anxiety in the mother later in pregnancy and the newborn. Several parameters were studied using Anxiety and Depression Scores, as the "predictors". The patients were chosen from my own private practice, which is an inherent limiting factor. This may have biased the type of subjects obtained, as well, the subjects were a small sample and parity was not controlled for. However, the literature does support the inference that parity does not necessarily affect maternal behavior.

The results do not support any previous work suggesting a significant relationship between maternal anxiety and complications of labor and delivery, or for that matter, with the behavior of the newborn.

It may well be that the scales used so far to measure anxiety, are not the type sensitive enough to measure the changes that take place in the psychological makeup in the pregnant woman. We must look at different "psychological" forms of assessment than the present available ones.

This also confirms the difficulty which faces a researcher in this field as to the number of variables which interact almost constantly and produce their effect collectively. Above all we must consider; motivation, degree of education, socioeconomic status, type of support available during labor and delivery. Therefore it becomes meaningless from a clinical point of view to discuss the effect of anxiety in any form without taking into consideration **"all"** the variables involved.

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APPENDIX 1

DEFINITIONS

Attachment: An emotional tie between two people, a bond, emotional commitment and affection. (Ainsworth, 1969; Bowlby, 1969; Schaffter, H.R., 1964).

Low Risk Pregnancy: Is an uncomplicated pregnancy which is considered as being predictive of a normal delivery with no unusual risks to the mother or baby due to any physical factor in the mother or occurring concomitantly with the pregnancy.

Apgar Score: This is a clinical assessment of the baby at one and five minutes after birth.

Biochemical Data: These are measurements of some chemical changes in the blood that are known to cause problems in the baby.

Healthy Term Infant: An infant born between 37 weeks and 42 weeks gestation, based on last normal menstrual period of the mother and whose physiological status does not require unusual medical and/or nursing care.

APPENDIX 2

TAYLOR'S M.A.S. SCALE

1.	I am often sick to my stomach	T	F
2.	I am about as nervous as other people	T	F
3.	I work under a great deal of strain.	T	F
4.	I blush as often as others.	T	F
5.	I have diarrhea("the runs") once a month or more	T	F
6.	I worry quite a bit over possible trouble.	T	F
7.	When embarrassed I often break out in a sweat which is very annoying.	T	F
8.	I do not often notice my heart pounding and I am seldom short of breath.	T	F
9.	Often my bowels don't move for several days at a time.	T	F
10.	At times I lose sleep over worry	T	F
11.	My sleep is restless and disturbed.	T	F
12.	I often dream about things I don't like to tell other people.	T	F
13.	My feelings are hurt easier than most people.	T	F
14.	I often find myself worrying about something.	T	F
15.	I wish I could be as happy as others.	T	F
16.	I feel anxious about something or someone almost all of the time.	T	F
17.	At times I am so restless that I cannot sit in a chair for very long.	T	F
18.	I have often felt that I faced so many difficulties I could not overcome them.	T	F
19.	At times I have been worried beyond reason about something that really did not matter.	T	F
20.	I do not have as many fears as my friends.	T	F
21.	I am more self-conscious than most people.	T	F
22.	I am the kind of person who takes things hard.	T	F
23.	I am a very nervous person.	T	F
24.	Life is often a strain for me.	T	F
25.	I am not at all confident of myself.	T	F
26.	At times I feel that I am going to crack up.	T	F
27.	I don't like to face a difficulty or make an important decision.	T	F
28.	I am very confident of myself.	T	F
29.	I do not tire quickly.	T	F
30.	I have very few headaches.	T	F
31.	I cannot keep my mind on one thing.	T	F
32.	I worry over money and business.	T	F
33.	I frequently notice my hand shakes when I try to do something.	T	F
34.	I practically never blush.	T	F
35.	I am often afraid that I am going to blush.	T	F
36.	I have nightmares every few nights.	T	F
37.	My hands and feet are usually warm enough.	T	F

38.	I sweat very easily even on cool days.	T	F
39.	I feel hungry almost all the time.	T	F
40.	I have a great deal of stomach trouble.	T	F
41.	I am easily embarrassed.	T	F
42.	I am usually calm and not easily upset.	T	F
43.	I cry easily.	T	F
44.	I am happy most of the time.	T	F
45.	It makes me nervous to have to wait.	T	F
46.	Sometimes I become so excited that I find it hard to get to sleep.	T	F
47.	I have been afraid of things or people that I know could not hurt me.	T	F
48.	I certainly feel useless at times.	T	F
49.	I find it hard to keep my mind on a task or job.	T	F
50.	At times I think I am no good at all.	T	F

APPENDIX 3

PITT'S QUESTIONNAIRE

Confidential

NAME: _____ _____ Date of Birth

We are asking you these questions in order to find out how you feel about things during this time of having your baby. Your answers will help us to help you. We want your answers to tell us how you feel **at the present time**, that is today, or over the past few days.

Please read the questions carefully and then answer as frankly and honestly as you can. Just answer "Yes" or "No", putting a circle round your own answer. If you really cannot make up your mind you may put a circle round "Don't Know", but try to avoid this if you can.

Don't spend too much time on any one question, but please don't miss any out. After you ahve finished the questions you are invited to write a few of your own words about the way you feel in the blank space at the bottom of this form.

At the present time -

1. Do you sleep well?	Yes	No	Don't know
2. Do you easily lose your temper?	Yes	No	Don't know
3. Are you worried about your looks?	Yes	No	Don't know
4. Have you a good appetite?	Yes	No	Don't know
5. Are you as happy as you ought to be?	Yes	No	Don't know
6. Do you easily forget things?	Yes	No	Don't know

At the present time -

7. Have you as much interest in sex as ever?	Yes	No	Don't know
8. Is everthing a great effort?	Yes	No	Don't know
9. Do you feel ashamed for any reason?	Yes	No	Don't know
10. Can you relax easily?	Yes	No	Don't know
11. Can you feel the baby is really yours?	Yes	No	Don't know
12. Do you want someone with you at all times?	Yes	No	Don't know

At the present time -

13. Are you easily woken up?	Yes	No	Don't know
14. Do you feel calm most of the time?	Yes	No	Don't know
15. Do you feel that you are in good health?	Yes	No	Don't know
16. Does food interest you less than it did?	Yes	No	Don't know
17. Do you cry easily?	Yes	No	Don't know
18. Is your memory as good as it ever was?	Yes	No	Don't know

At the present time -

19. Have you less desire for sex than usual?	Yes	No	Don't know
20. Have you enough energy?	Yes	No	Don't know
21. Are you satisfied with the way you're coping with things?	Yes	No	Don't know
22. Do you worry a lot about the baby?	Yes	No	Don't know
23. Do you feel unlike your normal self?	Yes	No	Don't know
24. Do you have confidence in yourself?	Yes	No	Don't know

Is there anything you want to add about your feelings at the moment? If so, please write here.

Signed: _____

Date: _____

APPENDIX 4
MISERICORDIA HOSPITAL EDMONTON
RESPIRATORY TECHNOLOGY
TIME SAMPLE ANALYSED

HOUR	DATE	TECH	LAB NO
		pH	
		PCO_2	mmHg
		PO_2	mmHg
		HCO_3	CALCULATED mmol/l
		BE	CALCULATED mmol/l
		O_2 CT	VoL%
		O_2 SAT%	CALCULATED %
		Bar Pres	mmHg
		Pat. Temp.	^oC
		Hb	g/dT
		CO_2 CT	VoL% CO_2
		(H+)	nm/T

P50	mmHg
CO-OXIMETER	
% O2 Hb	
% CO2 Hb	
% MetHb	
PATIENT DATA	
TEMP	^oC
TIME	
ARTERIAL	
VENOUS	
CAPILLARY	
OXYGEN	L/M
FIO2	%

Research

BLOOD GAS ANALYSIS

APPENDIX 5

BEHAVIOR SCORING SHEET

Initial state _____

Predominant State _____

Scale (Note State)	1	2	3	4	5	6	7	8	9
1. Response decrement to light (2,3)									
2. Response decrement to rattle (2,3)									
3. Response decrement to bell (2,3)									
4. Response decrement to pinprick (2,3)									
5. Orientation inanimate visual (4 only)									
6. Orientation inanimate auditory (4,5)									
7. Orientation animate visual (4 only)									
8. Orientation animate auditory (4,5)									
9. Orientation animate visual & auditory (4 only)									
10. Alertness (4 only)									
11. General tonus (4,5)									
12. Motor Maturity (4,5)									
13. Pull-to-sit (3,5)									
14. Cuddliness (4,5)									
15. Defensive movements (4)									
16. Consolability (6 to 5, 4, 3, 2)									
17. Peak of excitement (6)									
18. Rapidity of buildup (from 1,2 to 6)									
19. Irritability (3,4,5)									
20. Activity (alert states)									
21. Tremulousness (all states)									
22. Startle (3,4,5,6)									
23. Lability of skin color (from 1 to 6)									
24. Lability of states (all states)									
25. Sel-quieting activity (6,5 to 4,3,2,1)									
26. Hand-mouth facility (all states)									
27. Smiles (all states)									

APPENDIX 6

CORRELATIONS

	AP1	AP2	WT	COMP	HOURS LABOR	Ph	HCO3	BASE EXCESS	TMA	PITTS
COLUMN	1	2	3	4	5	6	7	8	9	10
ROW 1	1.000	0.389	-0.028	-0.114	0.055	0.205	0.051	-0.192	-0.188	-0.238
ROW 2	0.389	1.000	0.297	0.076	0.023	0.074	-0.029	-0.137	-0.319	-0.191
ROW 3	-0.028	0.297	1.000	0.255	-0.010	0.141	-0.115	-0.182	-0.003	0.057
ROW 4	-0.114	0.076	0.255	1.000	-0.081	0.193	-0.165	-0.059	0.264	-0.336
ROW 5	0.055	0.023	-0.010	-0.081	1.000	-0.255	0.285	0.155	-0.393	0.168
ROW 6	0.205	0.074	0.141	0.193	-0.255	1.000	-0.140	-0.769	-0.070	-0.247
ROW 7	0.051	-0.029	-0.155	-0.165	0.285	-0.140	1.000	-0.146	-0.167	-0.122
ROW 8	-0.192	-0.137	-0.182	-0.059	0.155	-0.769	-0.146	1.000	0.094	0.264
ROW 9	-0.188	-0.319	-0.003	0.264	-0.393	-0.070	-0.167	0.094	1.000	-0.067
ROW 10	-0.238	-0.191	0.057	-0.336	0.168	-0.247	-0.122	0.264	-0.067	1.000

T VALUES TO TEST HO:R=0

	1	2	3	4	5	6	7	8	9	10
COLUMN										
ROW 1	0.0	2.601	-0.175	-0.707	0.339	1.293	0.317	-1.204	-1.180	-1.511
ROW 2	2.601	0.0	1.920	0.470	0.143	0.455	-0.181	-0.851	-2.072	-1.201
ROW 3	-0.175	1.920	0.0	1.628	-0.065	0.877	-0.714	-1.141	-0.020	0.349
ROW 4	-0.707	0.470	1.628	0.0	-0.501	1.211	-1.031	-0.363	1.688	-2.918
ROW 5	0.339	0.143	-0.065	-0.501	0.0	-1.627	1.833	0.970	-2.634	1.053
ROW 6	1.293	0.455	0.877	1.211	-1.627	0.0	-0.871	-7.404	-0.432	-1.571
ROW 7	0.317	-0.181	-0.714	-1.031	1.833	-0.871	0.0	-0.909	-1.044	-0.759
ROW 8	-1.204	-0.851	-1.141	-0.363	0.970	-7.404	-0.909	0.0	0.583	1.686
ROW 9	-1.180	-2.072	-0.020	1.688	-2.634	-0.432	-1.044	0.583	0.0	-0.415
ROW 10	-1.511	-1.201	0.349	-2.198	1.053	-1.571	-0.759	1.686	-0.415	0.0

PROBABILITIES OF T

	1	2	3	4	5	6	7	8	9	10
COLUMN										
ROW 1	0.0	0.013	0.862	0.484	0.737	0.204	0.753	0.236	0.245	0.139
ROW 2	0.013	0.0	0.062	0.641	0.887	0.652	0.857	0.400	0 045	0.237
ROW 3	0.862	0.062	0.0	0.112	0.949	0.386	0.480	0.261	0.984	0.729
ROW 4	0.484	0.641	0.112	0.0	0.619	0.234	0.309	0.719	0.100	0.034
ROW 5	0.737	0.887	0.949	0.619	0.0	0.112	0.075	0.338	0.012	0.299
ROW 6	0.204	0.652	0.386	0.234	0.112	0.0	0.389	0.000	0.668	0.124
ROW 7	0.753	0.857	0.480	0.309	0.075	0.389	0.0	0.369	0.303	0.453
ROW 8	0.236	0.400	0.261	0.719	0.338	0.000	0.369	0.0	0.564	0.100
ROW 9	0 245	0.045	0.984	0.100	0.012	0.668	0.303	0.564	0.0	0.681
ROW 10	0.139	0.237	0.729	0.034	0.299	0.124	0.453	0.100	0.681	0.0

DEGREES OF FREEDOM = 38

DEST02 NORMALLY TERMINATED WITH A BLANK CARD ON APR 3, 1985

APPENDIX 7

CHI-SQUARE AND CORRELATIONS
CROSSTABULATION OF COMP BY TMAR

COUNT / COMP	TMAR 1	TMAR 2	TMAR 3	ROW TOTAL
0	4	4	2	10 23.3
2	3	1		4 9.3
3		2		2 4.7
4	6	8	11	25 58.1
5	1		1	2 4.7
COLUMN TOTAL	14 32.6	15 34.9	14 32.6	43 100.0

CHI-SQUARE	D.F.	SIGNIFICANCE	MIN E.F.	CELLS WITH E.F. 5
10.78890	8	0.2139	0.651	12 OF 15 (80.0%)

NUMBER OF MISSING OBSERVATIONS = 0

APPENDIX 8

CHI-SQUARE AND CORRELATIONS
CROSSTABULATION OF COMP BY PITTSR

COUNT / COMP	PITTSR 1	PITTSR 2	PITTSR 3	ROW TOTAL
0	2	3	5	10 23.3
2		3	1	4 9.3
3	1	1		2 4.7
4	10	7	8	25 58.1
5	1	1		2 4.7
COLUMN TOTAL	14 32.6	15 34.9	14 32.6	43 100.0

CHI-SQUARE	D.F.	SIGNIFICANCE	MIN E.F.	CELLS WITH E.F. 5
7.41033	8	0.4931	0.651	12 OF 15 (80.0%)

NUMBER OF MISSING OBSERVATIONS = 0

APPENDIX 9

CHI-SQUARE AND CORRELATIONS

VARIABLE TMA
BY VARIABLE COMP

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	4	221.0391	55.2598	2.0643	.1047
WITHIN GROUPS	38	1017.2400	26.7695		
TOTAL	42	1238.2791			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
GRP 0	10	15.9000	4.3576	1.3780	11.0000	23.0000	12.7827 TO 19.0173
GRP 2	4	12.0000	2.9439	1.4720	8.0000	15.0000	7.3156 TO 16.6844
GRP 3	2	17.5000	2.1213	1.5000	16.0000	19.0000	-1.5593 TO 36.5593
GRP 4	25	18.9200	5.3535	1.0707	9.0000	29.0000	16.7102 TO 21.1298
GRP 5	2	21.0000	11.3137	8.0000	13.0000	29.0000	-80.6496 TO 122.6496
TOTAL	43	17.6047	5.4298	.8280	8.0000	29.0000	15.9336 TO 19.2757

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM (VARIANCES) = .6779, P = .000 (approx)
BARTLETT-BOS F = 1.052 , P = .382
MAXIMUM VARIANCE/MINIMUM VARIANCE 28.444

APPENDIX 10

CHI-SQUARE AND CORRELATIONS

VARIABLE PITTS
BY VARIABLE COMP

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB
BETWEEN GROUPS	4	16.3442	4.0860	.9928	.4233
WITHIN GROUPS	38	156.4000	4.1158		
TOTAL	42	172.7442			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
GRP 0	10	14.4000	1.9551	.6182	12.0000	18.0000	13.0014 TO 15.7986
GRP 2	4	14.0000	.8165	.4082	13.0000	15.0000	12.7008 TO 15.2992
GRP 3	2	13.0000	1.4142	1.0000	12.0000	14.0000	.2938 TO 25.7062
GRP 4	25	13.2000	2.1985	.4397	9.0000	18.0000	12.2925 TO 14.1075
GRP 5	2	12.0000	1.4142	1.0000	11.0000	13.0000	-.7062 TO 24.7062
TOTAL	43	13.4884	2.0280	.3093	9.0000	18.0000	12.8642 TO 14.1125

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM (VARIANCES) = .3628, P = .235 (approx.)
BARTLETT-BOX F = .767 , P = .548
MAXIMUM VARIANCE/MINIMUM VARIANCE 7.250

VITA

NAME: Fawzy H. Morcos

DEGREES: M.B., B.Ch. Cairo, 1958
Diploma in Obstetrics & Gynecology, Dublin, 1965
M.R.C.O.G. (London) 1967
F.R.C.S. (Edin), 1968
F.R.C.S.(C), 1971
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POSITIONS: Associate Clinical Professor - Department of Obstetrics & Gynecology, University of Alberta.

Chief of Department of Obstetrics & Gynecology, Misericordia Hospital, Edmonton, Alberta.

PUBLICATIONS: Parameters of ovulation: A paper presented at the Royal College of Physicians and Surgeons Meeting in Ottawa, 1972.

The Effect of Norethindrone with and Without Estrogen on Serum Immunoreactive Luteinizing Hormone Secretion. Amer J of Obstet & Gynecol, 112(3);358, 1972.

Adrenocortical Function Studies During the Normal Menstrual Cycle and in Women Receiving Norethindrone With and Without Mestranol. Amer J of Obstet & Gynecol, 112(3);364,1972.

Thyroid Function Studies in Different Phases of the Menstrual Cycle and in Women Receiving Norethindrone With and Without Estrogen. Amer J of Obstet & Gynecol, 112(3);369,1972.

Anxiety and Depression in the Mother and Father and Their Relationship to Physical Complications of Pregnancy and Labour. Morcos, F. H. and Funke-Ferber, J. A paper presented at the Fifth International Conference of Psychosomatic Obstetrics & Gynecology, Rome, 1977.

The Relationship Between Maternal Anxiety/Depression and Maternal Medication and the Behaviour of the Newborn. Vetsch, E., Morcos, F. and Funke-Ferber, J. A paper presented at the Fifth International Conference of Psychosomatic Obstetrics & Gynecology, Rome, 1977.

Indicators of Maladaptive Behaviour. J. Funk-Ferber, F.H. Morcos. A paper presented at the Fifth International Conference of Psychosomatic Obstetrics & Gynecology, Rome, 1977.

PUBLICATIONS: Reaction of Women to Maternal-Child Care Program. A paper presented at the Sixth International Conference of Psychosomatic Obstetrics & Gynecology, Berlin, 1980.

RELATED EXPERIENCE: Chairman for 7 conferences on Psychosocial problems in Obstetrics & Gynecology held in Edmonton for the past 7 years.

Chairman for 8 conferences on Perinatal Medicine held in Edmonton for the past 8 years.

Presentations at several local and national meetings in Obstetrics & Gynecology.

SPECIAL TRAINING: Five months on a half time basis at the Royal Alexandra Hospital. Fetal assessment and ultrasound, 1984.

One month ultrasound training, Ultrasound Department, Grace Hospital, Vancouver, July 1984.